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U. S. NAVAL HOSPITAL
Mare Island, Vallejo, California

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From: Officer in Charge, Artificial Limb Department
To: Medical Officer in Command

Subj: Monthly Report of the Experimental Work of the Artificial Limb Department

Ref: (a) Advisory Committee on Artificial Limbs ltr dtd 21 Jun 1948
(b) Research Division ltr dtd 24 Jun 1949, BUMED CODE 71/DJD:gh

July

1. Monthly report required by references (a) and (b) is hereby submitted.

2. The following projects are under production, experimentation and further study:

(a) Lower Extremities Section:

I. Foot and Ankle (NM 009 035)

Dies for the sponge rubber ankle fairing are still being manufactured in the Naval Shipyard.

The machine for measuring the forces and torques in the ankle joint has been completed and a series of limbs are being tested, and graphs made to record the data. It is contemplated to ulize a series of artificial limbs which are being worn by amputees in order to determine forces the amputees are using in the ankle joints. These forces vary in a large degree according to the individual requirements of each patient. Graphs will be made to show the variation of forces allowable in the ankle joint when utilizing various duromater rubbers and various complressions of the rubber block. Six new designs of the rubber block have been built and will be tested. ~~The new designs of the rubber block have been built and will be tested~~. The new designs have been made in order to secure lower forces in rotation.

The accelerated testing machine is in use and various ankle joints are being life tested.

II. Shank (NM 009 015)

The woodworker is making the wooden models for the new shanks, the moulds for which will be manufactured in the Navy Yard.

Testing of various plastics, laminates, processes and methods of producing plastic shins is continuing.

III. Knee

(a) Mechanical (NM 009 036)

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The variable cadence knee joint has been re-designed and installed on a number of amputees. The latest design does not utilize a moving knee stop, which was causing a noise factor in the old design. A braking force is available in the latest design during the middle of the swing phase. Some amputees desire a braking effect during the middle of the swing phase and seem to walk better with it, while other amputees do not require any braking effect during the middle of the swing phase.

(b) Hydraulic (NM 009 037)

The hydraulic knee lock in the tilting table prosthesis is functioning satisfactorily with the exception of noise. This unit is being reworked in order to eliminate the noise factor.

IV. Cosmetic Problem (NM 009 025)

Additional limbs for female amputees have been fitted with the cosmetic covering.

V. Brief summary of status of models as a unit.

(a) Suction Socket (NM 009 029)

Additional cases have been satisfactorily fitted with below knee suction sockets. A number of soft sockets have been coated with a lacquer compound on the inner surface as a substitute for horsehide. This material has proven unsatisfactory because it cracks and frays--even though ten individual coats of the material were applied. The Dow Chemical Company has submitted a formula for a flexible plastic which we have used on several sockets, and which appears to be somewhat better. This is undergoing amputee testing. It is believed that should a satisfactory flexible plastic be found which will replace the horsehide lining for the soft suction socket, it will be a great improvement from the standpoint of hygiene.

(b) Slip Socket (NM 009 038)

A new type of slip socket has been designed, constructed and fitted on an amputee. This unit utilizes a metal bellows enclosing a sealed air chamber. The bellows is fastened to the bottom of the socket, and on the opposite end to a plate attached to the shin. As the amputee bears weight on the socket the metal bellows is compressed, and compresses the enclosed air. On the release of weight bearing, the socket moves out of the shin due to the forces being released on the enclosed compressed air.

(b) Upper Extremities Section:

I. Above elbow arm (NM 009 022)

A breadboard model of an elbow lock has been designed and is working satisfactorily. This elbow lock utilizes a set of worm gears. The action of this elbow lock works on the principle that when the stump extends or flexes

the arm section flexion and extension occur in the forearm. When the stump stops its motion in any position the forearm section automatically locks and is unlocked when the stump again moves the arm section. This unit is being installed in the standard Navy-Fitch arm.

II. Hands, Hooks and Tools (NM 009 023)

A lock for the Robinson hand has been installed and is being worn by an amputee.

III. Cosmetic Problem

No work has been done on the cosmetic problem of the arm this month.

IV. Harness and/or other outside control (NM 009 026)

Additional cases are being fitted with the single nylon shoulder harness.

V. Brief summary of status of models as a unit.

(a) Cineplastic Prosthesis (NM 009 031)

Pronation-supination is being added to the prosthesis on the right side on the bilateral, pectoralis, cineplastic amputee.

A below elbow amputee has undergone surgery for the construction of a biceps cineplastic motor. This patient has an excellent below elbow stump but desires to be rid of any shoulder harness.

T. J. CANTY
CDR, MC, USN